

902 KAR 100:100. Industrial radiography.

RELATES TO: KRS 211.842-211.852, 211.990(4), 10 C.F.R. 34, 71, 21 C.F.R. 1020.40

STATUTORY AUTHORITY: KRS 194A.050(1), 211.090(3), 211.844

NECESSITY, FUNCTION, AND CONFORMITY: KRS 211.844 requires the Cabinet for Health and Family Services to promulgate administrative regulations for the registration and licensing of the possession or use of sources of ionizing or electronic product radiation and the handling and disposal of radioactive waste. This administrative regulation establishes radiation safety requirements for industrial radiographic operations and shall apply to licensees or registrants who use sources of radiation for industrial radiography.

Section 1. Specific License and Registration Requirements for Industrial Radiography. (1) An Application for Radioactive Material License, incorporated by reference in 902 KAR 100:040, for a specific license or registration for the use of sources of radiation in industrial radiography shall be approved if the applicant meets the following requirements:

(a) Except as provided in subsection (3)(k) of this section, the applicant shall satisfy the general requirements specified in 902 KAR 100:040, Section 4, or 100:110 and 100:145, and any specific requirements contained in this administrative regulation.

(b) The applicant shall submit an adequate program for training a radiographer and a radiographers' assistant that meets the requirements of Section 14 of this administrative regulation.

1. An applicant shall not describe the initial training and examination program for a radiographer in the subjects outlined in Section 14 of this administrative regulation.

2. From June 30, 2000, to June 30, 2002, an applicant shall affirm that an individual acting as an industrial radiographer shall be certified in radiation safety by a certifying entity as described in 10 C.F.R. Part 34, Appendix A, before commencing duty as a radiographer. This affirmation shall substitute for a description of the initial training and examination program for a radiographer in the subjects outlined in Section 14 of this administrative regulation.

(c) The applicant shall submit procedures for verifying and documenting the certification status of a radiographer and for ensuring that the certification of an individual acting as a radiographer remains valid.

(d) The applicant shall submit written operating and emergency procedures as described in Section 15 of this administrative regulation.

(e) The applicant shall submit a description of a program for inspections of the job performance of a radiographer and a radiographers' assistant at intervals not to exceed six (6) months as described in Section 14 of this administrative regulation.

(f) The applicant shall submit a description of the applicant's overall organization structure as it applies to the radiation safety responsibilities in industrial radiography, including specified delegation of authority and responsibility.

(g) The applicant shall identify and list the qualifications of the individual designated as the radiation safety officer (RSO) and of the potential designees responsible for ensuring that the licensee's radiation safety program is implemented in accordance with the procedures that have been submitted to the cabinet and have received approval pursuant to Sections 13 and 15 of this administrative regulation.

(h) If an applicant intends to perform leak testing of sealed sources or exposure devices containing depleted uranium (DU) shielding, the applicant shall describe the procedures for performing and the qualifications of the person authorized to do the leak testing.

(i) If the applicant intends to analyze the applicant's own wipe samples, the application shall include a description of the procedures to be followed, which shall include:

1. Instruments to be used;
2. Methods of performing the analysis; and
3. Pertinent experience of the person analyzing the wipe samples.

(j) If the applicant intends to perform an "in-house" calibration of a survey instrument, the applicant shall describe the method to be used and the relevant experience of the person performing the calibration. A calibration shall be performed according to the procedures and at the intervals prescribed in Section 5 of this administrative regulation.

(k) The applicant shall identify and describe the location of each field station and permanent radiographic installation.

(l) The applicant shall identify the location where records required by this and other administrative regulations in 902 KAR Chapter 100 shall be maintained.

(2) A licensee shall maintain a copy of its license, documents incorporated by reference, and amendments to these items until superseded by new documents approved by the cabinet or until the cabinet terminates the license.

Section 2. Performance Provisions for Radiography Equipment. Equipment used in industrial radiographic operations shall meet the following criteria:

(1)(a) Except as provided in subsection (3)(k) of this section, a radiographic exposure device, source assembly, or sealed source and associated equipment shall meet the provisions specified in American National Standard Institute (ANSI) N432-1980, Radiological Safety for the Design and Construction of Apparatus for Gamma Radiography; and

(b) Engineering analysis shall be submitted by an applicant or licensee to demonstrate the applicability of previously performed testing on similar individual radiography equipment components. If upon review, the cabinet determines that the engineering analysis demonstrates that actual testing of the component is not necessary, the engineering analysis shall be an acceptable alternative.

(2)(a) A radiographic exposure device shall have attached to it by the user, a durable, legible, clearly visible label bearing the:

1. Chemical symbol and mass number of the radionuclide in the device;
2. Activity and date on which this activity was last measured;
3. Model or product code and serial number of the sealed source;
4. Manufacturer of the sealed source; and
5. Name, address, and telephone number of the licensee or registrant.

(b) A radiographic exposure device intended for use as a Type B transport container shall meet the applicable provisions of 10 C.F.R. 71.

(c) Modification of an exposure device, source changer, source assembly, or associated equipment shall be prohibited, unless the design of a replacement component, including source holder, source assembly, control, or guide tube, shall not compromise the design safety features of the system.

(3) In addition to the provisions specified in subsections (1) and (2) of this section, the following provisions shall apply to a radiographic exposure device, source assembly, and associated equipment that allow the source to be moved out of the device for radiographic operation or to a source changer:

(a) The coupling between the source assembly and the control cable shall be designed in a manner so that the source assembly cannot:

1. Become disconnected if cranked outside the guide tube; and
2. Be unintentionally disconnected under normal and reasonably foreseeable abnormal conditions.

(b) The device shall automatically secure the source assembly if it is cranked back into the fully shielded position within the device. The securing system shall be released only by a deliberate operation on the exposure device.

(c) Each outlet fitting, lock box, and drive cable fitting on a radiographic exposure device shall be equipped with a safety plug or cover, which shall be installed during storage and transportation to protect the source assembly from water, mud, sand, or other foreign matter.

(d) A sealed source or source assembly shall have attached to it or engraved on it, a durable, legible, visible label with the words: "DANGER-RADIOACTIVE." The label shall not interfere with the safe operation of the exposure device or associated equipment.

(e) The guide tube shall have passed:

1. A crushing test that closely approximates the crushing forces likely to be encountered during use; and

2. A kinking resistance test that closely approximates the kinking forces likely to be encountered during use.

(f) Guide tubes shall be used if moving the source out of the device.

(g) An exposure head or similar device designed to prevent the source assembly from passing out the end of the guide tube shall be attached to the outermost end of the guide tube during a radiographic operation.

(h) The guide tube exposure head connection shall withstand the tensile test for control units specified in ANSI N432-1980.

(i) A source changer shall provide a system for assuring that the source cannot be accidentally withdrawn from the changer if connecting or disconnecting the drive cable to or from a source assembly.

(j) A radiographic exposure device and associated equipment in use after January 10, 1996, shall comply with the provisions of this section.

(k) Equipment used in industrial radiography operations need not comply with paragraph 8.9.2(c) of the Endurance Test in American National Standards Institute N432-1980, if the prototype equipment has been tested using a torque value representative of the torque that an individual using the radiographic equipment can realistically exert on the lever or crankshaft of the drive mechanism.

Section 3. Limits on External Levels of Radiation for Radiographic Exposure Devices and Storage Containers. The maximum exposure rate limits for storage containers and source changers shall be:

(1) 200 millirems (2 millisieverts) per hour at any exterior surface; and

(2) Ten (10) millirems (0.1 millisieverts) per hour at one (1) meter from any exterior surface, with the sealed source in the shielded position.

Section 4. Locking of Radiographic Exposure Devices, Storage Containers, and Source Containers. (1) A radiographic exposure device shall have a lock or outer locked container designed to prevent unauthorized or accidental production of radiation or removal or exposure of a sealed source from its shielded position.

(a) An exposure device or its container shall be kept locked, and if a keyed lock, with the key removed at all times except:

1. If under the direct surveillance of a radiographer or radiographer's assistant; or

2. As authorized by Section 19 of this administrative regulation.

(b) During radiographic operation the sealed source assembly shall be secured in the shielded position each time the source is returned to that position.

(c) A sealed source storage container and source changer shall be:

1. Provided with a lock or outer locked container designed to prevent unauthorized or accidental removal of the sealed source from its shielded position; and
 2. Kept locked, and if a keyed lock, with the key removed at all times if containing sealed sources, except if under the direct surveillance of a radiographer or radiographer's assistant.
- (2) The control panel of a radiation machine shall be:
- (a) Equipped with a lock that prevents the unauthorized use of an x-ray system or the accidental production of radiation; and
 - (b) Kept locked and the key removed at all times, except if under the direct visual surveillance of a radiographer or radiographer's assistant.

Section 5. Radiation Survey Instruments. (1) A licensee or registrant shall maintain sufficient calibrated and operable radiation survey instruments at a location where a source of radiation is present in order to perform radiation surveys as required by this administrative regulation and 902 KAR 100:019, Section 12(1).

- (2) A radiation survey instrument shall be calibrated:
- (a) At intervals not to exceed six (6) months;
 - (b) After an instrument servicing, except for battery changes;
 - (c)1. At two (2) points located approximately one-third (1/3) and two-thirds (2/3) of full-scale for linear scale instruments;
 2. Midrange of each decade, and at two (2) points of at least one (1) decade for logarithmic scale instruments;
 3. At three (3) points between two (2) and 1,000 millirems (90.02 and ten (10) millisieverts) per hour for digital instruments; and
 - (d) So that an accuracy within plus or minus twenty (20) percent of the calibration source can be demonstrated at the points checked.
- (3) A record of each calibration shall be maintained for three (3) years after the calibration date for inspection by the cabinet.
- (4) Instrumentation required by this section shall have a range so that two (2) millirems (0.02 millisieverts) per hour through one (1) rem (0.01 sievert) per hour may be measured.

Section 6. Leak Testing and Replacement of Sealed Sources. (1) The replacement of a sealed source fastened to or contained in a radiographic exposure device, and leak testing, repairing, opening, or modification of a sealed source shall be performed by a person specifically authorized by the cabinet, the U.S. Nuclear Regulatory Commission, or an agreement state.

- (2) A sealed source shall be tested for leakage:
- (a) At intervals not to exceed six (6) months;
 - (b) Using a method approved by the cabinet, the U.S. Nuclear Regulatory Commission, or an agreement state; and
 - (c)1. By taking a wipe sample from the nearest accessible point to the sealed source where contamination might accumulate.
 2. The wipe sample shall be analyzed for radioactive contamination.
 3. The analysis shall be capable of detecting the presence of 0.005 microcuries (185 Bq) of radioactive material on the test sample; and
 4. The analysis shall be performed by a person specifically authorized by the cabinet, the U.S. Nuclear Regulatory Commission, or an agreement state to perform the analysis.
- (3) A sealed source shall not be used by the licensee until tested for leakage, except if:
- (a) The source is accompanied by a certificate from the transferor showing it to have been leak-tested within six (6) months preceding the transfer; or

(b) The source has been in storage and not in use for six (6) months or less.

(4)(a) A test conducted in accordance with subsections (1) and (2) of this section that reveals the presence of 0.005 microcuries (185 Bq) or more of removable radioactive material shall be considered evidence that the sealed source is leaking.

(b) The licensee shall immediately withdraw the equipment involved from use and shall have it decontaminated and repaired or disposed of in accordance with 902 KAR 100:021.

(c) The licensee shall file a report with the Manager, Radiation Health Branch, Department of Public Health, 275 East Main Street, Frankfort, Kentucky 40621, within five (5) days of a test with results that exceed the threshold in this subsection.

(d) The report shall describe the equipment involved, the test results, and the corrective action taken.

(5) An exposure device using depleted uranium (DU) shielding and an "S" tube configuration shall be tested for DU contamination at intervals not to exceed twelve (12) months.

(a) The analysis shall be:

1. Capable of detecting the presence of 0.005 microcuries (185 Bq) of radioactive material on the test sample; and

2. Performed by a person specifically authorized by the cabinet, the U.S. Nuclear Regulatory Commission, or an agreement state to perform the analysis.

(b) If testing reveals the presence of 0.005 microcuries (185 Bq) or more of removable DU contamination, the exposure device shall be removed from use until an evaluation of the wear on the S-tube has been made.

(c) If the evaluation reveals that the S-tube is worn through, the device shall not be used again.

(d) A DU shielded device shall:

1. Not require testing for DU contamination while in storage and not in use; and

2. Require testing before use or transfer if the interval of storage exceeded twelve (12) months.

(6)(a) A licensee shall maintain records of leak test results for each sealed source or device containing DU.

(b) The results shall be stated in units of microcuries (becquerels).

(c) The licensee shall retain a record for three (3) years after it is made or until the source in storage is removed.

Section 7. Quarterly Inventory. (1) A licensee or registrant shall conduct a quarterly physical inventory to account for each source of radiation and each device containing depleted uranium received or possessed in accordance with the license.

(2) Records of the inventories shall be maintained for three (3) years from the date of the inventory for inspection by the cabinet. The records of inventories shall include:

(a) Radionuclide;

(b) Number of curies (becquerels) or mass (for DU) in a device;

(c) Location of sealed sources and devices;

(d) Date of the inventory;

(e) Name of the individual making the inventory; and

(f) Manufacturer, model number, and serial number of each sealed source or device, as appropriate.

Section 8. Utilization Logs. A licensee or registrant shall maintain utilization logs, which shall be kept available for inspection by the cabinet for three (3) years from the date of the recorded

event, at the address specified in the license or on the registration, showing for a source of radiation the following information:

- (1) A description including make, model, and serial number of the exposure device, radiation machine, or transport or storage container in which a sealed source is located;
- (2) Identity and signature of the radiographer to whom assigned;
- (3) Site or plant where used and dates of use;
- (4) Date a source of radiation is removed from storage and returned to storage; and
- (5) For permanent radiographic installations, the dates a radiation machine is energized.

Section 9. Inspection and Maintenance of Radiographic Exposure Devices, Radiation Machines, Transport and Storage Containers, Associated Equipment, Source Changes, and Survey Instruments. (1) A licensee or registrant shall perform:

(a) Visual and operability checks on survey meters, radiographic exposure devices, radiation machines, transport and storage containers, associated equipment, and source changers before use on a day the equipment is to be used to ensure that the:

1. Equipment is in good working condition;
2. Source is adequately shielded; and
3. Required labeling is present; and

(b) An operability check of survey instruments using check sources or other appropriate means.

(2) If an equipment problem is found, the equipment shall be removed from service until repaired.

(3) A licensee or registrant shall have written procedures for:

(a) Inspection and routine maintenance of radiographic exposure devices, radiation machines, source changers, associated equipment, transport and storage containers, and survey instruments at intervals not to exceed three (3) months, or before the first use in order to ensure the proper functioning of components important to safety;

(b) Inspection and maintenance necessary to maintain the Type B packaging used to transport radioactive materials; and

(c) Inspection and maintenance program to assure that a Type B package is shipped and maintained in accordance with the certificate of compliance, or other approval.

(4) A replacement component shall meet design specifications.

(5) If an equipment problem is found, the equipment shall be removed from service until repaired.

(6)(a) A record of equipment problems found in daily checks and quarterly inspections of radiographic exposure devices, transport and storage containers, associated equipment, source changers, and survey instruments and of any maintenance performed in accordance with subsections (1) through (3) of this section shall be kept for three (3) years for inspection by the cabinet.

(b) The record shall include:

1. The date of check or inspection;
2. Name of the inspector;
3. Equipment involved;
4. Problems found; and
5. What repair and maintenance was done.

Section 10. Permanent Radiographic Installations. (1) Permanent radiographic installations with an entrance used for personnel access to a high radiation area shall have:

(a) Entrance controls of the type described in 902 KAR 100:019, Section 14(1)(b) and (c) and Section 14(2) that reduce the radiation level upon entry into the area; or:

(b) Both visible and audible warning signals to warn of the presence of radiation.

1. The visible signal shall be activated by radiation if the source is exposed or the machine is energized.

2. The audible signal shall be activated if an attempt is made to enter the installation while the source is exposed or the machine is energized.

(2)(a) The alarm system shall be tested for proper operation with a radiation source at the beginning of each day before the installation is used for radiographic operations.

(b) The test shall include a check of the visible and audible signals.

(c) Each entrance control device that reduces the radiation level upon entry, as designated in subsection (1) of this section, shall be tested monthly.

(3)(a) If an entrance device or alarm system is operating improperly, it shall be immediately labeled as defective and repaired within seven (7) calendar days.

(b) The facility may continue to be used during the seven (7) day repair period if the licensee:

1. Implements the continuous surveillance requirements of Section 19 of this administrative regulation; and

2. Uses an alarming ratemeter.

(4) Records of tests for entrance control and audible and visual alarms shall be maintained for inspection by the cabinet for three (3) years from the date of the test.

Section 11. Labeling, Storage, and Transportation. (1) A licensee shall not use a source changer or a container to store radioactive material unless the source changer or the storage container has securely attached to it a durable, legible, and clearly visible label bearing the standard trefoil radiation caution symbol conventional colors (magenta, purple or black on a yellow background, having a minimum diameter of twenty-five (25) millimeters), and the following words:

(a) 1. CAUTION*; or

2. DANGER;

(b) RADIOACTIVE MATERIAL; and

(c) NOTIFY:

1. CIVIL AUTHORITIES; or

2. NAME OF COMPANY.

(2) The licensee shall not transport radioactive material unless the material is packaged, and the package is labeled, marked, and accompanied with appropriate shipping papers in accordance with 10 C.F.R. Part 71.

(3) A locked radiographic exposure device, radiation machine, or storage container shall be physically secured to prevent tampering or removal by unauthorized personnel. The licensee shall store radioactive material in a manner that minimizes danger from explosion or fire.

(4) The licensee shall lock and physically secure the transport package containing radioactive material in the transporting vehicle to prevent accidental loss, tampering, or unauthorized removal of the radioactive material from the vehicle.

Section 12. Conducting Industrial Radiographic Operations. (1)(a) If radiography is performed at a location other than a permanent radiographic installation, the radiographer shall be accompanied by at least one (1) other qualified radiographer or an individual who has met the requirements of Section 14 of this administrative regulation. The additional qualified individual

shall observe the operations and be capable of providing immediate assistance to prevent unauthorized entry.

(b) Radiography shall not be performed unless more than one (1) qualified individual is present.

(2) A radiographic operation conducted at a location of use authorized on the license shall be conducted in a permanent radiographic installation, unless specifically authorized by the cabinet.

(3) A licensee shall have one (1) year from the effective date of June 27, 1998 to meet the requirement for having two (2) qualified individuals present at a location other than a permanent radiographic installation, as specified in subsection (1) of this section.

Section 13. Radiation Safety Officer for Industrial Radiography. The radiation safety officer (RSO) shall ensure that radiation safety is being performed in the daily operation of the licensee's program in accordance with approved procedures and regulatory requirements. (1) The minimum qualifications, training, and experience for RSOs for industrial radiography is as follows:

(a) Completion of the training and testing requirements of Section 14 of this administrative regulation;

(b) 2,000 hours of hands-on experience as a qualified radiographer in industrial radiographic operations; and

(c) Formal training in the establishment and maintenance of a radiation protection program.

(2) The cabinet shall consider alternatives if the RSO has:

(a) Appropriate training or experience in the field of ionizing radiation; and

(b) Adequate formal training in establishing and maintaining a radiation safety protection program.

(3) The specific duties and authorities of the RSO shall include:

(a) Establishing and overseeing operating, emergency and ALARA procedures as required by 902 KAR 100:019, and reviewing them regularly to ensure that the procedures in use conform to current 902 KAR 100:019 procedures, and conform to other requirements in 902 KAR Chapter 100 and to the license conditions.

(b) Overseeing and approving all phases of the training program for radiographic personnel, ensuring that appropriate and effective radiation protection is taught;

(c) Ensuring that:

1. Required radiation surveys and leak tests are performed and documented in accordance with 902 KAR Chapter 100, including corrective measures if levels of radiation exceed established limits;

2. Personnel monitoring devices are calibrated and used properly by occupationally-exposed personnel;

3. Records are kept of the monitoring results;

4. Timely notifications are made as required by 902 KAR 100:019, Section 40; and

5. Operations are conducted safely; and

(d) Assuming control for instituting corrective actions including stopping of operations, if necessary.

(4) A licensee or registrant shall have two (2) years from the effective date of June 27, 1999 to meet the requirements of subsections (1) and (2) of this section.

Section 14. Training. (1) A licensee or registrant:

(a) Shall not permit an individual to act as a radiographer as defined in 902 KAR 100:010 until the individual has received:

1. Formal training in the subjects identified in subsection (4) of this section;
2. At least two (2) months of on-the-job training; and
3. Is certified through a radiographer certification program in accordance with the criteria specified in Section 1 of this administrative regulation; or

(b) May, until two (2) years from the effective date of June 27, 1999, allow an individual who has not met the requirements of this section, to act as a radiographer if the individual has:

1. Received training in the subjects identified in subsection (4) of this section; and
2. Demonstrated an understanding of the subjects by successful completion of a written examination previously submitted to and approved by the cabinet;

(c) Shall not permit an individual to act as a radiographer until the individual has:

1. Received copies of and instructions in the following:
 - a. Provisions contained in this administrative regulation;
 - b. Provisions of 902 KAR 100:019, 100:040, 100:070, and 100:165;
 - c. Conditions of the license or registration certificate issued by the cabinet; and
 - d. The licensee's or registrant's approved operating and emergency procedures;
2. Demonstrated understanding of the licensee's license and operating and emergency procedures by successful completion of a written or oral examination covering this material;
3. Received training in the:
 - a. Use of the licensee's sources of radiation, the registrant's radiation machine, and other radiation exposure devices;
 - b. Daily inspection of devices and associated equipment; and
 - c. Use of radiation survey instruments; and
4. Demonstrated an understanding of the use of radiographic exposure devices, sources, survey instruments, and associated equipment described in paragraphs (a) and (c) of this subsection, by successful completion of a practical examination covering the material;

(d) Shall not permit an individual to act as a radiographer's assistant as defined in 902 KAR 100:010 until the individual has:

1. Received copies of and instructions in the following:
 - a. Provisions contained in this administrative regulation;
 - b. Requirements of 902 KAR 100:019, 100:040, 100:070, and 100:165;
 - c. Conditions of the license or registration certificate issued by the cabinet; and
 - d. The licensee's or registrant's operating and emergency procedures;
2. Demonstrated competence to use, under the personal supervision of the radiographer, the sources of radiation, radiographic exposure devices, radiation machines, associated equipment, and radiation survey instruments that the assistant uses; and
3. Demonstrated:
 - a. Understanding of the instructions provided in paragraph (a) of this subsection by successfully completing a written test on the subjects covered; and
 - b. Competence in the use of hardware described in paragraph (b) of this subsection by successfully completing a practical examination on the use of the hardware; and

(e) Shall provide annual refresher safety training for a radiographer and radiographer's assistant at intervals not to exceed twelve (12) months.

(2)(a) Except in those operations in which a single individual shall serve as both radiographer and RSO and shall perform all radiography operations, the RSO or designee shall conduct an inspection program of the job performance of a radiographer and radiographer's assistant to ensure that 902 KAR Chapter 100, license requirements, and the applicant's operating and emergency procedures are followed.

(b) The inspection program shall include observation of the performance of the radiographer and radiographer's assistant during an actual industrial radiographic operation, at intervals not to exceed six (6) months;

(c) If a radiographer or a radiographer's assistant has not participated in an industrial radiographic operation for more than six (6) months since the last inspection, the radiographer shall demonstrate knowledge of the training requirements of subsection (3) of this section and the radiographer's assistant shall demonstrate knowledge of the training requirements of subsection (1)(d)2 of this section by a practical examination before either person may next participate in a radiographic operation; and

(d) The cabinet shall consider alternatives in those situations in which the individual serves as both radiographer and RSO.

(3) Records of training specified in subsection (1)(c) of this section shall be maintained by a licensee or registrant for inspection by the cabinet for three (3) years after the record is made.

(a) Records shall include:

1. Radiographer certification documents;
2. Verification of certification status;
3. Copies of written tests;
4. Dates of oral tests and practical examinations;
5. Names of individuals conducting and receiving the oral and practical examinations; and
6. Documentation of annual refresher safety training and semi-annual inspections of job performance for a radiographer and a radiographer's assistant, which shall include:
 - a. Topics discussed during the refresher safety training;
 - b. Dates the annual refresher safety training was conducted; and
 - c. Names of the instructors and attendees.

(b) For inspections of job performance, the records shall also include a list showing the items checked and all noncompliances observed by the RSO.

(4) The licensee or registrant shall include the following subjects required in subsection (1)(b) of this section:

(a) Fundamentals of radiation safety including:

1. Characteristics of gamma radiation;
2. Units of radiation dose and quantity of radioactivity;
3. Hazards of exposure to radiation;
4. Levels of radiation from radioactive material; and
5. Methods of controlling radiation dose by time, distance, and shielding;

(b) Radiation detection instruments including:

1. Use, operation, calibration, and limitations of radiation survey instruments;
2. Survey techniques; and
3. Use of personnel monitoring equipment;

(c) Equipment to be used including:

1. Operation and control of radiographic exposure equipment, remote handling equipment, and storage containers, including pictures or models of source assemblies (pigtailed);
2. Storage, control, and disposal of radioactive material;
3. Inspection and maintenance of equipment; and
4. Operation and control of radiation machines;

(d) The requirements of 902 KAR Chapter 100, as applicable; and

(e) Case histories of accidents in radiography.

(5) A licensee or registrant shall have one (1) year from June 27, 1998 to comply with the additional training requirements specified in subsections (1)(c) and (d) of this section.

(6) Licensees and registrants shall have one (1) year from June 27, 1999, to comply with the certification requirements specified in subsection (1) of this section. Records of radiographer certification maintained in accordance with subsection (3) of this section shall provide appropriate affirmation of certification requirements specified in subsection (1) of this section.

Section 15. Operating and Emergency Procedures. (1) A licensee's or registrant's operating and emergency procedures shall include instructions in at least the following:

(a) The handling and use of sources of radiation to be employed so an individual is not likely to be exposed to radiation doses in excess of the limits established in 902 KAR 100:019, Section 3;

(b) Methods and occasions for conducting radiation surveys;

(c) Methods for controlling access to radiographic areas;

(d) Methods and occasions for locking and securing a source of radiation, radiographic exposure device, or transport and storage container;

(e) Personnel monitoring and the use of personnel monitoring equipment, including steps that shall be taken immediately by radiography personnel if a pocket dosimeter is found to be off-scale or an alarm ratemeter alarms unexpectedly;

(f) Transportation of sources of radiation to field locations, including:

1. Packing of a radiographic exposure device and storage container in a vehicle;

2. Placarding of a vehicle if needed; and

3. Control of sources of radiation during transportation;

(g) Minimizing exposure of individuals if an accident occurs;

(h) The procedure for notifying proper personnel if an accident occurs;

(i) Maintenance of records; and

(j) The inspection, maintenance, and operability checks of radiographic exposure devices, radiation machines, storage containers, survey instruments, and transport containers.

(2) The licensee or registrant shall maintain copies of current operating and emergency procedures until the cabinet terminates the license.

(3) Superseded material shall be retained for three (3) years after the change is made.

Section 16. Personnel Monitoring. (1) A licensee or registrant shall not permit an individual to act as a radiographer or radiographer's assistant unless, at all times during radiographic operations, the individual wears on the trunk of the body a direct reading pocket dosimeter, an operating alarm ratemeter, and a personal dosimeter that is processed and evaluated by an accredited National Voluntary Laboratory Accreditation Program (NVLAP) processor.

(2) The wearing of an alarm ratemeter shall not be required for permanent radiography facilities in which another alarming or warning device is in routine use or during radiographic operations using radiation machines.

(3) Pocket dosimeters shall have a range from zero to at least 200 milliroentgens (two (2) millisieverts) and shall be recharged daily or at the start of a shift. Electronic personal dosimeters may be used in place of ion-chamber pocket dosimeters only.

(4) A personal dosimeter shall be assigned to, and worn by, only one (1) individual.

(5) A film badge shall be replaced each month, and other personal dosimeters processed and evaluated by an accredited NVLAP processor shall be replaced at intervals not to exceed three (3) months.

(6) After replacement, each personal dosimeter shall be processed as soon as possible.

(7) Direct reading dosimeters, such as pocket dosimeters or electronic personal dosimeters, shall be read and exposures recorded at the beginning and end of a shift.

(a) If an individual's pocket dosimeter is found to be off scale, or if the electronic personal dosimeter reads greater than 200 millirems (two (2) millisieverts), and the possibility of radiation exposure cannot be ruled out as the cause:

1. The individual's personal dosimeter shall be sent for processing within twenty-four (24) hours;

2. Radiographic operations by the individual shall cease; and

3. The individual shall not return to work with sources of radiation until a determination of the radiation exposure has been made by the RSO or the RSO's designee. The results shall be included in the records maintained in accordance with paragraph (b) of this subsection and subsection (10)(b) of this section.

(b) A licensee or registrant shall maintain the following exposure records:

1. Direct reading dosimeter readings and yearly operability checks for three (3) years after the record is made;

2. Reports received from the NVLAP processor of personal dosimeter results until the cabinet terminates the license; and

3. Records of estimates of exposures as a result of off-scale personal direct reading dosimeters, or lost or damaged personal dosimeters, until the cabinet terminates the license.

(8) If a personal dosimeter is lost or damaged, the worker shall cease work immediately until:

- (a) A replacement personal dosimeter meeting the requirements of subsection (1) of this section is provided; and

- (b) The exposure is calculated for the time period from issuance to loss or damage of the personal dosimeter. The results of the calculated exposure and the time period for which the personal dosimeter was lost or damaged shall be included in the records maintained in accordance with subsection (7) of this section.

(9)(a) Pocket dosimeters, or electronic personal dosimeters, shall be checked for correct response to radiation at periods not to exceed twelve (12) months.

- (b) Acceptable dosimeters shall read within plus or minus twenty (20) percent of the true radiation exposure.

(10)(a) An alarm ratemeter shall:

1. Be checked to ensure that the audible alarm functions properly prior to use at the start of a shift;

2. Be set to give an alarm signal at a preset dose rate of 500 mR/hr (5mSv/hr);

3. Require special means to change the preset alarm functions;

4. Be calibrated at periods not to exceed twelve (12) months for correct response to radiation; and

5. Alarm within plus or minus twenty (20) percent of the true radiation dose rate.

- (b) Records of alarm ratemeter calibrations shall be maintained for three (3) years after the record is made.

Section 17. Documents Required at Field Stations and Temporary Job Sites. A licensee or registrant shall have the following records available for inspection by the cabinet at each field station, if applicable, and at each job site:

- (1) A copy of the operating and emergency procedures;

- (2) A current copy of the radioactive material license or registration certificate;

- (3) A copy of 902 KAR 100:019, 100:100, and 100:165;

- (4) Latest survey records required by Section 22 of this administrative regulation;

- (5) Records of direct reading dosimeters, such as pocket dosimeters or electronic personal dosimeters readings, as required by Section 16 of this administrative regulation;

- (6) Evidence of The latest instrument calibration of the radiation survey instrumentation in use at the site, as required by Section 5 of this administrative regulation;
- (7) Utilization records for each radiographic exposure device dispatched from that location, as required by Section 8 of this administrative regulation;
- (8) Records of equipment problems identified in daily checks of equipment required by Section 9 of this administrative regulation;
- (9) Records of alarm system and entrance control checks required by Section 10 of this administrative regulation, if applicable;
- (10) Evidence of the latest calibrations of alarm ratemeters and operability checks of pocket dosimeters and electronic personal dosimeters, as required by Section 16 of this administrative regulation;
- (11) The shipping papers for the transportation of radioactive materials required by 902 KAR 100:070; and
- (12) If operating in accordance with reciprocity pursuant to 902 KAR 100:065, a copy of the agreement state or U.S. Nuclear Regulatory Commission license authorizing the use of radioactive materials.

Section 18. Specific Provisions for Radiographic Personnel Performing Industrial Radiography. (1) At a job site, the following shall be supplied by a licensee or registrant:

- (a) At least one (1) operable, calibrated survey instrument for every exposure device or radiation machine in use;
 - (b) A current whole body personnel monitor (TLD or film badge) for an individual performing radiographic operations;
 - (c) An operable, calibrated pocket dosimeter with a range of zero to 200 milliroentgens for a worker performing radiographic operations;
 - (d) Appropriate barrier ropes and signs; and
 - (e) An operable, calibrated, alarming ratemeter for every person performing radiographic operations using a radiographic exposure device.
- (2) A radiographer at a job site shall have on the radiographer's person a valid certificate ID card issued by a certifying entity.
- (3) An industrial radiographic operation shall not be performed if the items in subsections (1) and (2) of this section are not available at the job site or they are inoperable.
- (4) During an inspection by the cabinet, the cabinet shall terminate an operation if items in subsections (1) and (2) of this section are not available or not operable, or if the required number of radiographic personnel are not present. Operations shall not be resumed until required conditions are met.

Section 19. Surveillance. During a radiographic operation, a radiographer or the other individual present, as required by Section 12 of this administrative regulation, shall maintain direct visual surveillance of the operation to protect against unauthorized entry into a high radiation area, except at a permanent radiographic installation where:

- (1) Entryways are locked; and
- (2) The requirements of Section 10 of this administrative regulation are met.

Section 20. Posting. (1) An area in which radiography is being performed shall be conspicuously posted, as required in 902 KAR 100:019, Section 24(1) and (2).

(2) Exceptions listed in 902 KAR 100:019 do not apply to an industrial radiographic operation.

Section 21. Special Provisions and Exemptions for Cabinet X-ray Systems. (1) The use of a certified or certifiable cabinet x-ray system shall be exempt from the requirements of this administrative regulation, except for the following:

(a) For certified and certifiable cabinet x-ray systems, including those designed to allow admittance of individuals:

1. A registrant shall not permit an individual to operate a cabinet x-ray system until the individual has received a copy of and instruction in the operating procedures for the unit.

2. A test for proper operation of interlocks shall be conducted and recorded at intervals not to exceed six (6) months.

3. A registrant shall perform an evaluation of the radiation dose limits to determine compliance with 902 KAR 100:019, Section 10, and 21 C.F.R. 1020.40, Cabinet X-ray Systems, at intervals not to exceed one (1) year.

4. Records shall be maintained demonstrating compliance with subsections (1)(a)1 and 2 of this section until disposal is authorized by the cabinet.

5. Records of the evaluation required by subparagraph 3 of this paragraph shall be maintained for two (2) years after the evaluation is performed.

(b)1. Certified cabinet x-ray systems shall be maintained in compliance with 21 C.F.R. 1020.40, Cabinet X-ray Systems.

2. A modification shall not be made to the system unless prior cabinet approval has been granted.

(2) An industrial use of a hand-held light intensified imaging device shall be exempt from the requirements of this administrative regulation if the dose rate eighteen (18) inches from the source of radiation to any individual does not exceed two (2) millirem per hour. A device exceeding this limit shall meet the applicable requirements of this administrative regulation and the licensing or registration requirements of 902 KAR 100:040 and 100:110, as applicable.

Section 22. Radiation Surveys and Survey Records. (1) A radiographic operation shall not be conducted unless calibrated and operable radiation survey instrumentation, as described in Section 5 of this administrative regulation, is available and used at a location of radiographic operations.

(2) A survey with a radiation survey instrument shall be made after a radiographic exposure of the radiographic exposure device and the guide tube if approaching the device or guide tube to determine that the sealed source has been returned to its shielded position before exchanging films, repositioning the exposure head, or dismantling equipment.

(3) A survey shall be conducted of the radiographic exposure device with a calibrated radiation survey instrument if the source is exchanged and if a radiographic exposure device is placed in a storage area, to ensure that the source is in its shielded position.

(4) A physical radiation survey shall be made after a radiographic exposure using radiographic machines to determine that the machine is "off."

(5) Records shall be kept of the exposure device survey conducted before the device is placed in storage as specified in subsection (3) of this section if that survey is the last one performed in the workday. The records shall be maintained for inspection by the cabinet for three (3) years after it is made.

Section 23. Supervision of Radiographer's Assistant. (1) If a radiographer's assistant uses radiographic exposure devices, associated equipment, sealed sources, or conducts radiation surveys required by Section 22 of this administrative regulation to determine that the sealed source has returned to the shielded position after an exposure or the radiation machine is off, the radiographer's assistant shall be under the personal supervision of a radiographer.

(2) The radiographer shall:

- (a) Be physically present at the site where a source of radiation and associated equipment is being used;
- (b) Watch, by direct visual observation, the performance of the operations performed by the radiographer's assistant referred to in this section; and
- (c) Be in close proximity so that immediate assistance shall be given if required.

Section 24. Reporting Requirements. (1) In addition to the reporting requirements specified in 902 KAR 100:040, Section 15, and in accordance with other sections of this administrative regulation, a licensee or registrant shall provide a written report to the Cabinet for Health and Family Services, Radiation Health Branch within thirty (30) days of the occurrence of the following incidents involving radiographic equipment:

- (a) Unintentional disconnection of the source assembly from the control cable;
- (b) Inability to retract the source assembly to its fully shielded position and secure it in this position;
- (c) Failure of a component, critical to safe operation of the device, to properly perform its intended function;
- (d) Failure of an indicator on a radiation machine to show that radiation is being produced;
- (e) Failure of an exposure switch to terminate production of radiation if turned to the off position; or
- (f) Failure of a safety interlock to terminate x-ray production.

(2) The licensee or registrant shall include the following information in a report submitted in accordance with subsection (1) of this section:

- (a) A description of the equipment problem;
- (b) Cause of an incident, if known;
- (c) Manufacturer and model number of equipment involved in the incident;
- (d) Place, time, and date of the incident;
- (e) Actions taken to establish normal operations;
- (f) Corrective actions taken or planned to prevent recurrence; and
- (g) Qualifications of personnel involved in the incident.

(3) A report of an overexposure submitted under 902 KAR 100:019, Section 40, involving failure of a safety component of radiography equipment shall include the information specified in subsection (2) of this section.

(4) A licensee shall notify the cabinet if conducting radiographic operations or storing radioactive material at a location not listed on the license for a period in excess of 180 days in a calendar year.

Section 25. Incorporation by Reference. (1) The American National Standard Institute (ANSI) N432-1980, "Radiological Safety for the Design and Construction of Apparatus for Gamma Radiography", published in NBS Handbook 136, issued January 1981, is incorporated by reference.

(2) This material may be inspected, copied, or obtained, subject to applicable copyright law, at the Department for Public Health, Office of the Commissioner, 275 East Main Street, Frankfort, Kentucky 40621, Monday through Friday, 8 a.m. until 4:30 p.m. (1 Ky.R. 408; eff. 1-5-1975; Am. 3 Ky.R. 167; eff. 9-1-1976; 12 Ky.R. 1065; eff. 1-3-1986; 16 Ky.R. 2552; eff. 6-27-1990; 20 Ky.R. 2398; eff. 4-11-1994; 21 Ky.R. 2305; eff. 4-19-1995; 27 Ky.R. 1615; 2165; eff. 2-1-2001; 38 Ky.R. 387; 961; eff. 11-16-2011; 41 Ky.R. 945; 1635; eff. 2-5-2015.)